临床研究

Willis覆膜支架治疗颈内动脉血泡样动脉瘤的临床效果

王 刚,张国忠,李明洲,何小艳,刘 丹,宋 烨,漆松涛,冯文峰
南方医科大学南方医院神经外科,广东 广州 510515

摘要:目的 应用Willis覆膜支架系统治疗颈内动脉血泡样动脉瘤,评估其安全性及有效性。**方法** 2014年12月~2016年02月,南方医科大学南方医院神经外科单纯采用颅内Willis覆膜支架系统,治疗8例颈内动脉血泡样动脉瘤。术中根据血管条件,在保证载瘤动脉安全的前提下,尽可能将导引导管位置升高(靠近海绵窦段),提供足够支撑,覆膜支架到位后再予释放栓塞动脉瘤。**结果** (1)对8例(8个血泡样动脉瘤)患者共置入9枚覆膜支架,其中8枚成功置入载瘤动脉。6例置入Willis支架后即刻造影,显示病变完全消失,载瘤动脉通畅;1例置入1枚Willis支架后,有少量对比剂漏入动脉瘤(内漏),予再植入1枚覆膜支架,复查造影动脉瘤完全不显影;(2)1例血泡样动脉瘤因颈内动脉迂曲,支架系统到位困难,术中发生医源性颈动脉海绵窦瘘(CCF),球囊栓塞后予搭桥并载瘤动脉闭塞。术后患者因脑室外引流并发颅内感染,积极抗感染治疗后逐渐恢复;(3)术后6个月对8例患者均行临床随访,mRS评分0分6例,1分2例。术后6个月DSA随访,动脉瘤均无复发,1例载瘤动脉轻度狭窄,但患者无神经功能障碍,搭桥患者桥血管通畅。**结论** Willis覆膜支架是颈内动脉血泡样动脉瘤的有效治疗方法。

关键词:颈内动脉血泡样动脉瘤;Willis覆膜支架;介入治疗

Efficacy and safety of Willis covered stent for treatment of blood blister-like aneurysm

WANG Gang, ZHANG Guozhong, LI Mingzhou, HE Xiaoyan, LIU Dan, SONG Ye, QI Songtao, FENG Wenfeng
Department of Neurosurgery, Nanfang Hospital, Southern Medical University, Guangzhou 510515, China

Abstract: Objective To evaluate the safety and short-term efficacy of Willis covered stent for treatment of blood blister-like aneurysms (BBA). **Methods** Eight patients with BBA were treated with Willis covered stent system during the period from December 2014 to February 2016. The guiding catheter was placed as high as possible to facilitate the delivery of the covered stent system. **Results** Nine covered stents were implanted in the aneurysms of 8 patients (8 aneurysms), and 8 stents were released successfully in the parent arteries. In 6 patients, angiography immediately after stent release showed complete disappearance of the aneurysm and the parent arteries remained patent. One patient experienced a minor endoleak after stent implantation, and another stent was implanted to eliminate the endoleak. Iatrogeniccarotid-cavernous fistula occurred in 1 patient due to tortuosity of the parent artery, for which superficial temporal artery-to-middle cerebral artery bypass combined with parent artery occlusion was performed instead; the patient recovered smoothly and the bypass remained patent at 6 months after the operation. No other periprocedural complications occurred in these patients. Follow-up study showed no new-onset neurological deficits in these 8 patients, who had mRS score of 0 in 6 patients and of 1 in 2 patients. Digital subtractive angiography at 6 months after the operation demonstrated no aneurysm in these patients, and only one patient showed mild stenosis in the parent artery. **Conclusion** Willis covered stents are effective for treatment of BBA with good safety and short-term outcomes.

Key words: blood blister-like aneurysms; Willis covered stents; endovascular therapy

血泡样动脉瘤因其特殊的病理性质或解剖特点,临床上无论采取何种治疗方式,均存在一定难度,死残率较高[1]。随着材料、理念的发展,如支架辅助栓塞、血流导向装置等,血管内介入技术为血泡样动脉瘤的治疗带来了长足的进展,但仍存在复发率高、再出血等风险[2-5]。Willis覆膜支架是专用于颅内脑血管系统的覆膜支架,由球囊与覆膜支架两部分组成,通过血管腔内动脉瘤隔绝术即不使用弹簧圈的情况下使动脉瘤与载瘤动脉隔绝闭塞动脉瘤,实现载瘤血管重建,为血泡样动脉瘤的治疗提供了一种新型高效治疗方式[6-7]。南方医科大学南方医院神经外科2014年12月~2016年2月,应用颅内Willis覆膜支架系统,治疗8例血泡样动脉瘤,效果明确。

收稿日期:2015-11-04
基金项目:广东省医学科研基金(B2013237)
作者简介:王 刚,博士,主治医师,电话 020-62787640,E-mail: ang2wg@126.com
通信作者:冯文峰,博士,副主任医师,电话 020-62787640

1 对象和方法

1.1 研究对象

2014年12月~2016年2月,南方医科大学南方医院神经外科采用颅内Willis覆膜支架系统,治疗8例血泡样动脉瘤。年龄42~61岁(平均年龄49.2岁),女性7例,男性1例。均以蛛网膜下腔出血起病,Hunt-Hess分级2

级4例,3级3例,4级1例。1例外院行支架辅助栓塞后复发再出血,1例合并双侧脑室血肿,外院行双侧脑室外引流术。所有患者入院均经脑血管造影(DSA)明确诊断。

1.2 方法

1.2.1 术前检查及药物准备 常规检查:完善凝血功能、胸片、心电图等常规检查。

DSA造影:行全脑血管造影,并三维重建,测量载瘤动脉直径,动脉瘤大小及瘤颈宽度,动脉瘤与周围侧枝血管位置关系。如果预测覆膜支架会覆盖眼动脉,造影时则需行球囊闭塞试验(Scepter球囊,闭塞眼动脉开口),评估患者视力、视野有无影响,及颈外动脉代偿情况,如有缺血,则为禁忌症,则改行其他治疗方式。如果动脉瘤与胚胎型后交通动脉、脉络膜前动脉位置关系密切,覆膜支架植入后可能导致血管闭塞,亦不选择Willis覆膜支架术。

药物准备:择期手术:术前3 d开始服用抗血小板聚集药物,波立维75 mg/d,阿司匹林100 mg/d;急诊手术:术前2 h顿服波立维300 mg,阿司匹林300 mg。

1.2.2 手术过程 全麻后取平卧位,右腹股沟部常规消毒铺单,穿刺部位局部浸润麻醉,以Seldinger法穿刺右侧股动脉,置6F鞘。全身肝素化,持续加压滴注。泥鳅导丝配合下上6F导引导管(Envoy或Neuro或者Navien管)至患侧颈内动脉,尽量靠近病变部位。行DSA脑血管造影,并行3D重建,再次测量载瘤动脉直径,动脉瘤大小及瘤颈宽度,动脉瘤与周围侧枝血管位置关系。基于上述数据,选择合适Willis覆膜支架,微导管引导下快速交换至颈内动脉动脉瘤瘤颈,多角度造影明确支架已覆盖动脉瘤颈(近、远端各4 mm),再缓慢重影球囊并以命名压维持10 s左右保持支架完全扩张、释放。泄空球囊后复查造影,如动脉瘤即刻完全消失,则撤出球囊,观察5~10 min后复查造影,载瘤动脉通畅,结束手术;如仍有造影剂进入动脉瘤(内漏),根据内漏形式,给予观察、球囊再次扩张、再植入支架等处理。

1.2.3 术后处理 术后追加一次肝素,自然中和。口服阿司匹林100 mg和氯吡格雷75 mg,1次/d,维持6周,6周以后单用阿司匹林100 mg/d,长期口服。对所有患者行临床随访及DSA随访。

2 结果

2.1 术中结果

8例患者共使用9枚支架,7例患者均一次成功,其中1例置人1枚Willis支架后,有少量对比剂漏入动脉瘤(内漏),予再植入1枚覆膜支架,复查造影动脉瘤完全不显影。1例外院栓塞后复发性右侧颈内动脉血泡样动脉瘤患者,年龄大,血管迂曲,支架系统到位困难,术中发生医源性CCF,球囊栓塞后二期予搭桥并载瘤动脉闭塞(典型病例见图1)。

2.2 预后及随访

7例患者顺利恢复,1例患者因脑室外引流并发颅内感染,经积极治疗后逐渐恢复。所有患者术后CT未见新发梗塞、出血等(图1)。术后3~6月对8例患者均行临床随访,mRS评分0分6例,1分2例。术后6个月DSA随访,动脉瘤均无复发,1例载瘤动脉轻度狭窄,但患者无神经功能障碍,搭桥患者桥血管通畅。

3 讨论

颈内动脉血泡样动脉瘤位于其前壁非分支部位,具有宽基底、薄壁等特点,病因尚不明确,因此有学者称之为谜一样的动脉瘤。采用夹闭、包裹等方式治疗,临床预后差[8]。血管内介入治疗包括多支架帖敷、支架辅助栓塞等,存在复发率高、再出血等风险[9-10]。血流导向装置已初步应用于血泡样动脉瘤的治疗,但由于出血急性期,而血流导向装置并不能立即将动脉瘤与循环完全隔绝,亦存在再出血风险[2]。

覆膜支架在不使用弹簧圈的情况下使动脉瘤与载瘤动脉隔绝闭塞动脉瘤,代表了动脉瘤治疗的一种新理念,即载瘤动脉的重建,为血泡样动脉瘤的治疗提供了一种新的治疗方式。文献中已有覆膜支架治疗颅内颅内动脉瘤的报道,早期多为外周覆膜支架,如Jostent等[11]冠脉支架,相对于颅内血管,存在硬度较大,通过性差等缺点,限制了其在颅内动脉瘤治疗中的应用。Willis颅内覆膜支架系统是一种新型颅内专用覆膜支架,不同于外周覆膜支架的三明治结构,采用单层覆膜裹覆于支架骨架外层,膜管两端与支架骨架固定、其余部分游离,容许覆膜支架在迂曲的血管内伸展时覆膜和支架骨架有一定程度的相互位移,增加顺应性[12]。支架系统预装于半顺应性球囊,采用快速交换技术,降低操作复杂程度,目前已成功应用于动脉瘤、CCF等颅内复杂血管疾病的治疗,临床效果显著[6-7, 13-14]。

覆膜支架在隔绝动脉瘤的同时必然对邻近侧枝血管产生闭塞性影响,因此术前的影像及功能评估至关重要。血泡样动脉瘤多位于颈内动脉床突上段,重要分支包括眼动脉、后交通动脉、脉络膜前动脉。眼动脉与颈外动脉系统有广泛的吻合,闭塞后大部分可以有效代偿,而不至于引起重要功能障碍,但术前需进行球囊闭塞试验,以确保安全。而对于后交通动脉,特别是胚胎型后交通动脉,闭塞后可能导致大脑后动脉供血区梗塞,引起视力视野障碍等,而后交通动脉上重要穿支血管闭塞(乳头体大动脉等)甚至引起偏瘫、昏迷等[15]。脉络膜前动脉的闭塞可引起偏瘫、偏盲、偏身感觉障碍"三偏综合征"[16]。因此术前对载瘤动脉重要侧枝血管的评估尤为重要,如果预测动脉瘤与侧枝血管关系密切,覆膜支架植入后可能导致严重缺血事件,则应该选择放弃覆膜支架术。

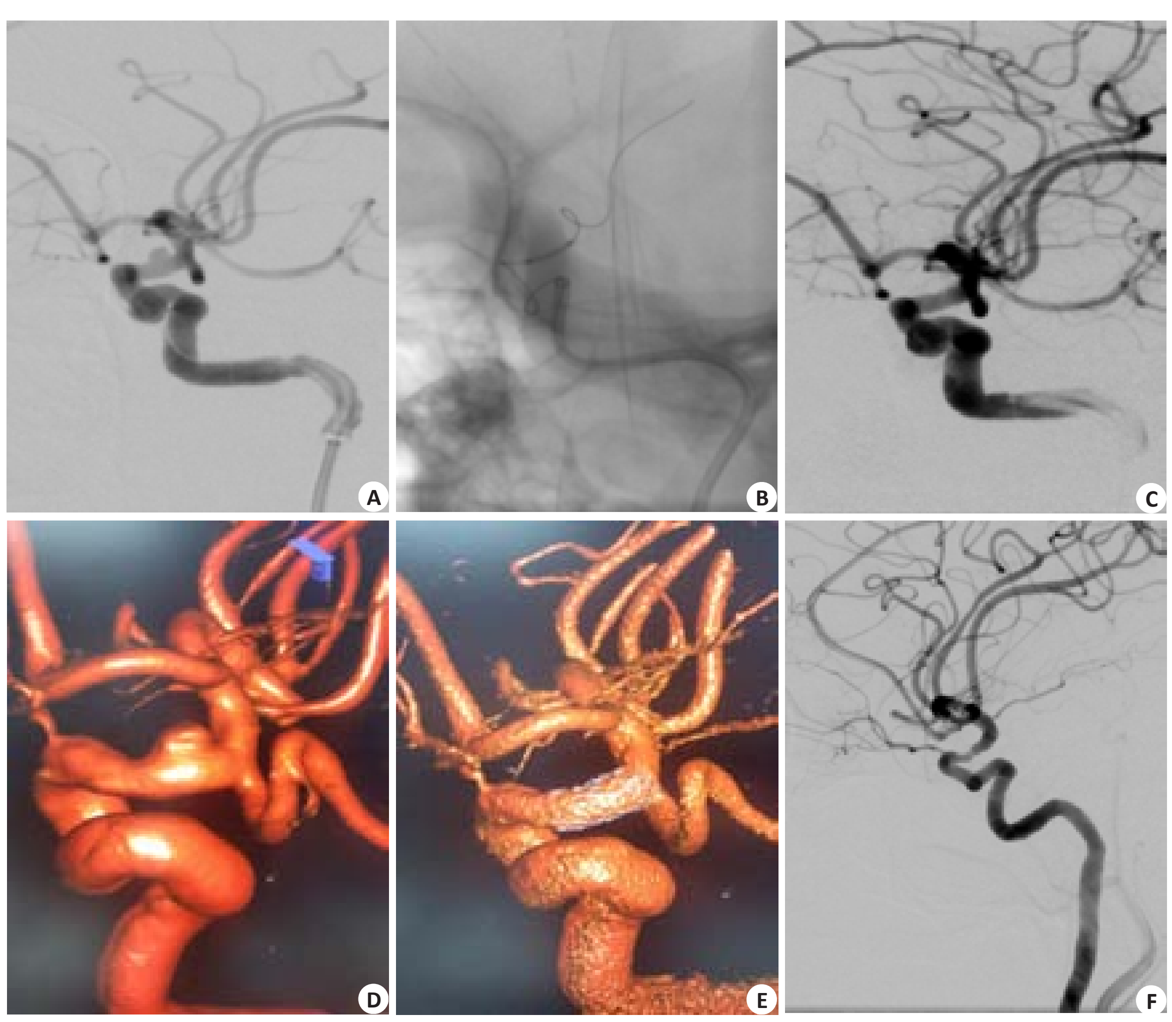


图1 女性,46岁,SAH,右侧颈内动脉血泡样动脉瘤病例

Fig.1 A typical case of blood blister like aneurysm (BBA) treated with Willis covered stent in a 46-year-old female patient. CT showed SAH. SAF: Subarachnoid hemorrhage. *A*: Angiography identified the presence of BBA in the right internal artery; *B*: Implantation of Willis covered stent system; *C*: Intraoperative angiography showing immediate disappearance of the aneurysm; *D-E*: Pre- and postoperative 3D-DSA showing the absence of aneurysms. The ophthalmic artery, posterior communicating artery and anterior choroidal artery were well preserved; *F*: follow-up DSA showing no signs of aneurysm with only mild intra-stent stenosis of the parent artery which did not cause any ischemic symptoms.

严格把握适应症后,则需进一步评估血管条件,建立有效的同轴支撑系统,以保证支架的顺利植入。年轻患者一般为Ⅰ型弓,颈内动脉无迂曲、成袢等,可以直接用Envoy到达颈内动脉岩骨段,再通过快速交换系统将Willis覆膜支架系统到位,球囊扩张后释放支架,本组有3例患者通过Envoy支撑系统顺利释放Willis支架。而对于年龄较大患者,弓上血管及颈内动脉因长期高血压、动脉粥样硬化等表现为不同程度的迂曲,增加了栓塞路径的复杂性,普通的6F Envoy无法提供稳定、有效的支撑力,此时可以通过8F导引导管内套叠6F Neuro导引导管技术,建立高效的支撑系统。本组有1例患者通过此型同轴系统顺利输送Willis覆膜支架,但因为颈内动脉极度迂曲,套叠支撑系统建立后,Willis覆膜支架仍难以通过呈U型的并且有支架植入的颈内动脉虹吸段,术中出现医源性颈内动脉海绵窦瘘,尽管球囊栓塞后改行外科手术治疗顺利恢复,但仍需高度警惕此类型迂曲载瘤动脉,特别是既往行支架辅助栓塞的病例,有效避免操作相关并发症 。术前造影评估血管条件较差时可以选用Navien颅内支撑导管[17-18],具有到位远、内径大,支撑能力强的特点,在临床需要的情况下,Navien真正能入硬膜环、到达C5以上,甚至M2段。本组中有4例患者颈内动脉迂曲复杂,虹吸段呈U型,Willis覆膜支架直接通过瘤颈困难[11],因此使用Navien支撑导管达到动脉瘤颈附近,再上Willis覆膜支架,顺利到位后球囊扩张释放支架,动脉瘤即刻完全不显影,效果确切。

本组共8例患者接受Willis覆膜支架术,成功7例,术后随访,临床症状均稳定。术后3~6个月再获得DSA随访,动脉瘤无复发,1例载瘤动脉轻度狭窄。搭桥患者随访血管超声,提示桥血管通畅。因此通过严格把握适应症选择合适的病例,颈内动脉血泡样动脉瘤可以通过

Willis覆膜支架进行安全、有效的治疗。

参考文献：

[1] Szmuda T, Sloniewski P, Waszak PM, et al. Towards a new treatment paradigm for ruptured blood blister-like aneurysms of the internal carotid artery? A rapid systematic review[J]. J Neurointerv Surg, 2016, 8(5): 488-94.

[2] Nerva JD, Morton RP, Levitt MR, et al. Pipeline embolization device as primary treatment for blister aneurysms and iatrogenic pseudoaneurysms of the internal carotid artery[J]. J Neurointerv Surg, 2015, 7(3): 210-6.

[3] Aydin K, Arat A, Sencer S, et al. Treatment of ruptured blood blister-like aneurysms with flow diverter SILK stents[J]. J Neurointerv Surg, 2015, 7(3): 202-9.

[4] Fang YB, Li Q, Wu YN, et al. Overlapping stents for blood blister-like aneurysms of the internal carotid artery[J]. Clin Neurol Neurosurg, 2014, 123: 34-9.

[5] Lim YC, Kim BM, Suh SH, et al. Reconstructive treatment of ruptured blood blister-like aneurysms with stent and coil[J]. Neurosurgery, 2013, 73(3): 480-8.

[6] Tan HQ, Li MH, Li YD, et al. Endovascular Reconstruction with the Willis covered stent for the treatment of large or giant intracranial aneurysms[J]. Cerebrovasc Dis, 2011, 31(2): 154-62.

[7] Tan HQ, Li MH, Zhang PL, et al. Reconstructive endovascular treatment of intracranial aneurysms with the Willis covered stent: medium-term clinical and angiographic follow-up[J]. J Neurosurg, 2011, 114(4): 1014-20.

[8] Yu B, Zheng J, Hong Y, et al. Stent-Assisted coil embolization of ruptured supraclinoid blood Blister-Like aneurysm of internal carotid artery[J]. Turk Neurosurg, 2016, 26(2): 219-22.

[9] Song J, Oh S, Kim MJ, et al. Endovascular treatment of ruptured blood blister-like aneurysms with multiple (≥3) overlapping Enterprise stents and coiling[J]. Acta Neurochir (Wien), 2016, 158(4): 803-9.

[10] Chan AW, Yadav JS, Krieger D, et al. Endovascular repair of carotid artery aneurysm with Jostent covered stent: initial experience and one-year result[J]. Catheter Cardiovasc Interv, 2004, 63(1): 15-20.

[11] 李明华. 一种新型的脑动脉瘤血管内治疗技术——脑血管覆膜支架术的问世[J]. 介入放射学杂志, 2010, 19(4): 253-6.

[12] Wang YL, Ma J, Li YD, et al. Application of the willis covered stent for the management of posttraumatic carotid-cavernous fistulas: an initial clinical study[J]. Neurol India, 2012, 60(2): 180-4.

[13] 田彦龙, 宋冬雷, 冷 冰, 等. 国产Willis覆膜支架治疗复杂性颅内动脉瘤的疗效及长期随访[J]. 中国脑血管病杂志, 2012, 9(10): 535-40.

[14] 杨雷霆, 朱贤立, 黄 玮, 等. 后交通动脉的显微外科解剖[J]. 中华实验外科杂志, 2003, 20(10): 924-5.

[15] 李洪翠, 李 肖, 唐承薇, 等. 脉络膜前动脉解剖及其临床意义的研究进展[J]. 解剖与临床, 2010, 15(1): 57-9.

[16] Lin LM, Colby GP, Huang J, et al. Ultra-distal large-bore intracranial access using the hyperflexible Navien distal intracranial catheter for the treatment of cerebrovascular pathologies: a technical note[J]. J Neurointerv Surg, 2014, 6(4): 301-7.

[17] Colby GP, Lin LM, Huang J, et al. Utilization of the navien distal intracranial catheter in 78 cases of anterior circulation aneurysm treatment with the pipeline embolization device[J]. J Neurointerv Surg, 2013, 5(Suppl 3): iii16-21.

（编辑：经 媛）

（上接1159页）

treated with prednisolone and methotrexate[J]. Intern Med, 2012, 51(20): 2957-60.

[5] 黄汉源, 孙 强, 王学晶, 等. 100例非哺乳期乳腺炎的外科治疗[J]. 中华乳腺病杂志: 电子版, 2013, 7(3): 40-3.

[6] Salehi M, Salehi H, Moafi M, et al. Comparison of the effect of surgical and medical therapy for the treatment of idiopathic granulomatous mastitis[J]. J Res Med Sci, 2014, 19(Suppl 1): S5-8.

[7] Gall A, Treuting P, Elkon KB, et al. Autoimmunity initiates in nonhematopoietic cells and progresses via lymphocytes in an interferon-dependent autoimmune disease[J]. Immunity, 2012, 36(1): 120-31.

[8] Meroni PL, Schur PH. ANA screening: an old test with new recommendations[J]. Ann Rheum Dis, 2010, 69(8): 1420-2.

[9] (pisetsky DS. The complex role of DNA, histones and HMGB1 in the pathogenesis of SLE[J]. Autoimmunity, 2014, 47(8): 487-93.

[10] Ozel L, Unal A, Unal E, et al. Granulomatous mastitis: is it an autoimmune disease? Diagnostic and therapeutic dilemmas[J]. Surg Today, 2012, 42(8): 729-33.

[11] Ogura K, Matsumoto T, Aoki Y, et al. IgG4-related tumour-forming mastitis with histological appearances of granulomatous lobular mastitis: comparison with other types of tumour-forming mastitis[J]. Histopathology, 2010, 57(1): 39-45.

[12] 苏 莉. 浆细胞性乳腺炎CD3、CD20、CD68表达及其免疫机制研究[D]. 宁夏医科大学, 2009: 1-49.

[13] 夏亚茹, 陈红风, 叶媚娜, 等. 非哺乳期乳腺炎患者外周血T淋巴细胞、免疫球蛋白及补体水平的变化[J]. 中华乳腺病杂志: 电子版, 2012, 6(5): 504-14.

[14] Chougule A, Bal A, Das A, et al. IgG4 related sclerosing mastitis: expanding the morphological spectrum of IgG4 related diseases[J]. Pathology, 2015, 47(1): 27-33.

[15] Della-Torre E, Lanzillotta M, Doglioni C. Immunology of IgG4-related disease[J]. Clin Exp Immunol, 2015, 181(2): 191-206.

（编辑：吴锦雅）